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Haines' report on
the resources of the
South and North Alabama
railroad.

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Class F 326

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HAINES' REPORT

ON THE

TRAFFIC RESOURCES

OF THE

South & North Alabama Railroad.

Hiram Haines



MONTGOMERY, ALA.:

BARRETT & BROWN, STEAM PRINTERS AND BOOK BINDERS.

1872.

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REPORT.

MONTGOMERY, ALA., November 8, 1872.

F. M. Gilmer, Jr., President S. & N. A. R. R.:

Sir : In proceeding to carry out your instructions to make a topographical and geological examination of the country contiguous to the line of the South and North Alabama Railroad, with a view to ascertain approximately the value of the lands of the Company, and to form an estimate of the traffic resources existing and susceptible of being developed by its influence, I have endeavored to conduct my investigations in such a manner as would enable me to collect as much specific information as possible in the immediate vicinity of the road ; and as opportunity was afforded, have extended my observations so as to obtain a more comprehensive acquaintance with the general features of the region embraced within the limits of my survey.

The execution of that part of my instructions which referred to the mineral resources of the country through which the road is located, was rendered easier by the fact that the line of the road crosses the strike of the strata comprised in the several formations over which it passes, with but a short and unimportant exception, throughout its entire length, and a section taken along its profile will at once exhibit the geological structure of the adjacent country. My first object, therefore, was to make a careful examination of the character and inclination of these various strata, in order to construct such a section, from which, as a base, to extend my inquiries ; relying upon my own observation for positive information concerning the location, extent and character of the mineral deposits.

This section, together with maps illustrating the topography and geology of the country, accompanies this report; and for the purpose of a more complete elucidation of questions respecting the relative geographical position of the mineral region of Alabama, with the developments of mining and iron manufacturing industries in other portions of the country, as well as to show the relation which your road bears as an agent in the development of the general resources of the State, and as a channel of commercial intercourse, I have also prepared a map of the United States showing its most important connections, and embodying the fullest information that I could collect respecting the location and present status of the iron manufacturing and coal mining operations throughout the country. Reference to these will enable me to present with more clearness a description of the field of my survey, and to convey more intelligently the views which I may find occasion to express respecting its prospective development and comparative importance.

In earlier days of railway enterprise, the popular idea associated the construction of a railroad with the immediate and exclusive accommodation of local interests, and it was a difficult matter for many intelligent people to realize the full power, or appreciate the promise, which the very presence of the improvement now constantly suggests and assures. Through the development of the country, stimulated by its necessities, and strengthened by the growth of intelligence in all matters of practical utility, local interests have become more intimately blended with those of a general character, and the scope of human action can no longer be circumscribed by selfish ideas, any more than by immediate physical obstacles. Time and experience have demonstrated that mutual dependence is the true basis of individual independence; and no grander illustration of this fact exists, than is shown in the condition of both the internal and external commerce of the United States to-day, as compared with its condition twenty or thirty years ago.

The old world, it is true, is still somewhat in advance of us in tangible wealth, because of its greater facilities and long established means of supplying the necessities of mankind, but far behind us in the very resources which constitute its present source of power. The annual value of the foreign commerce of Great Britain has now reached the enormous figure of \$3,000,000,000, and that of France, which, in this respect, is the second nation in the world, is estimated at \$1,500,000,000. The rapidity with which the United States have advanced, however, affords a notable commentary upon the spirit of the greater mass of the people, and the vigor which the consciousness of inexhaustible natural resources on all sides about them, infuses into their character. In 1852 our total foreign commerce was \$422,000,000. To-day, although a depressing civil war has intervened, it has reached \$1,200,000,000. Our railroad system, the great medium of internal commerce, affords a still more striking example of rapidly augmented prosperity, having increased from twenty-three miles of track in 1830, to over sixty thousand miles at the present time, and according to the census statistics for the past year, transporting a gross value of \$15,000,000,000—an amount exceeding that of the combined foreign commerce of the whole world.

These facts, thus briefly presented, are sufficient to show not merely what has been, but what almost incredible things we may fairly anticipate will be accomplished by the direct energy and enterprise of the present epoch, in the development of trade, and how important it is to combine general with local interests, and to adopt a liberal and comprehensive view in estimating the results, as well as in the prosecution, of every great work of internal improvement.

By the completion of the South and North Alabama Railroad, the very heart of the West will be opened to the State of Alabama, and the State with its vast mineral deposits, and agricultural products, the chief of which constitutes one of the greatest treasures of modern civilization.

tion, together with Southern seaboard and Gulf connections, opened to the West, affording opportunity for commercial intercommunication more direct, and more absolutely certain of advantageous results to Alabama, than has ever yet fallen to the lot of any Southern State. With Louisville and Montgomery as the central termini of the combination effected by the enterprise, each being a depot of supply and distribution, for sections of country on the one hand alive with the productive energy of an enterprising population, and on the other teeming with the wealth of natural products and resources, a result will have been consummated which insures the rapid development of the latter, and a consequent advancement of the material wealth of the State which could scarcely have been accomplished by any other means. This development must, however, proceed under conditions involving the prompt exercise of a spirit on the part of the people of the State as liberal and practical as that which has been exhibited in the completion of this great work. Prospective commercial power, based upon old ideas, will never come.

The city of Montgomery, the southern terminus of the South and North Alabama Railroad, is situated practically about the centre of the State, at an elevation of 162 feet above the Gulf, and possesses all the advantages of healthfulness and convenience of location essential to a metropolis. Being the terminus of four other important railroads, branching out into the eastern, southern and southwestern portions of the country, it commands, by these several avenues of communication, every section of the Gulf States, which, with its position in the centre of the cotton region, renders it naturally the seat of the distributive inland commerce of the State. That its trade will be vastly stimulated by the communication which your line gives it with the North-west, is beyond question, as the importance of its relation to the commerce which will thus be developed, is manifest by its geographical position.

It is connected by rail with Pensacola, Florida, one of the finest and most capacious harbors in America, having

a depth of water at its entrance of twenty-four feet, which is more than fully maintained alongside the wharves of the city. Pensacola must eventually become a principal port of entry and export in the trade between Europe and the Southern and Western States, as well as the chief emporium of the iron and coal trade with Cuba, Mexico, the Isthmus, and South America, and for the supply of all steamers traversing the Gulf.

During the present year 800 foreign ships have entered the harbor of Pensacola, and the number will probably exceed a thousand by the end of the year. But few of these vessels come otherwise than in ballast, their object being to procure outward-bound freights of cotton and lumber. The facilities now afforded by the South and North Alabama Railroad and its connections render this a channel of foreign importation to the West quite as expeditious, and twenty per cent. cheaper, than by way of New York; and whenever this becomes known and fully understood, the shipping which now comes to Pensacola empty, must find lucrative freights in this direction, as well as upon their return. The North German Lloyd and Liverpool steamers, that now pay an exorbitant charge for lighterage over the mud shoals at the mouth of the Mississippi, and from \$7 to \$15 per ton for coal at New Orleans, must also perceive in the ample depth of water at Pensacola, and its supply of cheap coal, together with the facility of direct and rapid communication with all parts of the interior, points of advantage too obvious and important to disregard. They must sooner or later discover that Pensacola is the best harbor for their termini on the Gulf, and the commercial relation which will then ensue between that port and Montgomery cannot be other than of the greatest interest and importance to the latter.

It is scarcely necessary to refer to the advantages possessed by Montgomery, in view of its situation and the ultimate development of the broad sphere of its trade, for every variety of manufactures into which the products of the State may be converted. It may, however, be re-

marked, that being the market for 75,000 or 100,000 bales of cotton annually, it should for this, if no other reason, be the seat of an extensive cotton manufacturing industry. Estimates show, also, that iron can be made in Montgomery from Red Mountain ore at 20 per cent. less cost than in the Lehigh region of Pennsylvania. The question, therefore, in regard to the establishment of works at this distance from the materials required for the production of iron, is one mainly of the expediency of the investment of local capital in the development of local industries. While it is clearly advantageous, to economical production, for a manufactory of any description to be located contiguously to the materials it employs, facility of transportation and labor being equal, there can be no doubt that iron works established in Montgomery would always afford a larger profit upon the investment than is realized by many of the largest establishments situated in other parts of the United States. At Cleveland, Ohio, for example, the blast furnaces in operation are using Lake Superior ores, for which they are paying \$10.50 per ton; and at Wheeling the ore from the Iron Mountain of Missouri is obtained, at \$12.60 per ton; while Red Mountain ore can be delivered in Montgomery at less than half the cost of the least of these. In fact, the cost of the ore alone, necessary to make a ton of iron, either at Cleveland or Wheeling, estimating its metallic value at 60 per cent., is more than the pig iron would cost manufactured in Montgomery.

It will be seen by reference to the map of the Southern division of the road, that the line, after leaving the neighborhood of Montgomery, passes over a post-tertiary formation to within a short distance of Calera. The lands in this region of the State are chiefly valuable for their forests of yellow pine timber, though a very large area included in the creek bottoms comprises very excellent land for general agriculture. The average yield of lumber, for thirty or forty miles along the line, in the counties of Autauga and Baker, is variously estimated by lumbermen at 5,000 to 8,000 feet per acre. Numerous saw mills have

been erected in this district since the completion of this part of the road, but such is the extraordinary demand for this kind of lumber, that the supply appears to be never adequate.

If we consider for a moment what a vast amount of this material must be required to supply the demand occasioned by its great superiority and general application for the construction of houses, bridges, railroad cars, and innumerable minor purposes, we will appreciate at once not only the enormous extent of the trade which is daily growing out of it, but the intrinsic value of this production, and the inestimable importance of husbanding and promoting its growth. This species of pine is confined chiefly to a comparatively narrow strip of country occupying the eastern and southern portions of the Southern States on the Atlantic, and those bordering on the Gulf, and though seemingly extensive in area, is far from being inexhaustible under the ravages which a rapidly increasing consumption is making upon it.

The country becomes more and more elevated as we proceed north from Montgomery until within fifteen miles of Calera, at which point an altitude of over 700 feet is attained. This elevation constitutes the southwestern extremity of the Blue Ridge chain; the upheaval apparently having expended its greatest force in Virginia, North Carolina and Georgia, terminated in producing the promontory of elevated land which crosses the line of the road at this point, and exposing the metamorphic rocks which occupy the middle eastern portion of the State.

The Coosa river, which courses along the western border of the metamorphic rocks, runs nearly parallel to, and a few miles east of this portion of the road. The numerous falls along its course afford the most eligible sites for utilizing the immense power which it is capable of supplying, while the healthfulness of this region, its proximity to the cotton, its easy access to railway transportation, and possessing a climate in every respect adapted, combine to

render it a most favorable locality for the establishment of cotton manufactories.

There is no subject at the present time of more vital importance to every interest in the State, than that of increasing the production of wealth by the conversion of our raw materials into manufactured articles. Facts and figures have, in this connection, from time to time been brought to bear upon the subject of cotton manufacturing in Alabama, by gentlemen of knowledge and experience in this department of industry, which furnish incontrovertible proof of its lucrative ness, and the special advantages possessed here for investment in this field of industrial enterprise. Too much, however, cannot be said to induce the consideration of capitalists and our legislators upon such questions as relate to the promotion and encouragement of such enterprises, nor can the fact be too forcibly and persistently impressed upon the public mind, that *with every pound of raw material exported from the State, the difference between its value in the raw state, and as a manufactured article, is practically exported also, and supplies the capital which supports manufacturing communities elsewhere.* It is a fact worthy of profound reflection, that the accumulated capital derived from the manufacture of cotton goods, and the necessities of the labor employed in it, throughout America and Europe, has been exported from the Southern States. "Any State," says an eminent writer on political economy, "that exports her raw material, feeds the children of other nations, and impoverishes her own;" and no truth is more fully attested than this is, in the results which have attended the exportation of cotton from the South. Of the 956 establishments for the manufacture of cotton goods in the United States, expending an aggregate of about \$40,000,000 annually for wages, 131 only are situated in the entire South, and but 13 in the State of Alabama, which previously to the war raised about one-fifth of the cotton consumed by the civilized world.

Beds of kaolin, graphite, manganese, roofing slate, asbestos and primary iron ores occur along the Coosa river

at no very remote distance from the railroad, but the actual extent and value of these deposits I have been unable to ascertain. A most admirable building stone is obtained in the gneissoid granite which is exposed at several places near the river, and which is scarcely inferior in beauty to marble. It is a fine grained rock, very hard and white, and even in large masses presents no appearance of stratification, but it is nevertheless interstratified with the mica shists, has the same strike and dip, and is evidently a sedimentary rock.

A few miles south of Calera we encounter the blue limestone of the Silurian formation, which possesses superior qualities for the manufacture of lime. About 150,000 barrels of lime are now made annually at Calera and in that vicinity, which is disposed of at all points in the South and Southwest, but chiefly in the markets of Montgomery, Mobile and New Orleans. The production is far from being adequate to the sale which might be readily obtained for it. This manufacture in Alabama is found to compete successfully with the lime produced at the North, even in the cities of Charleston and Savannah—markets that are accessible to Northern establishments by cheap water carriage. A nett profit of about 50 cents per barrel is made upon the entire production, a much larger profit, of course, being realized upon that disposed of to the trade of the Gulf States than can be obtained in the Atlantic seaboard cities.

At Calera, where the line intersects the Selma, Rome and Dalton Railroad, we enter the zone of the great deposit of fibrous brown hematite which extends, at intervals, from the southern portion of Jones' valley, east of Tuscaloosa, where the bed is over 100 feet in thickness, around the southern border of the Cahaba coal-field near the towns of Montevallo, Calera and Columbiana, to the northeastern portion of the State. It is upon this belt of ore that the Roup's Valley, Briarfield, Shelby, and Oxford furnaces are located. The quality of the iron manufactured from this ore is best indicated by the market quotations of it, the

highest prices being obtained for it. The cost of its reduction at the Shelby works, where charcoal is employed, is something over \$20 per ton—the cost here being considerably augmented by the expense of hauling the charcoal from a distance.

In proceeding north from Calera, for a distance of about fifteen miles, the line passes over a district of country generally fertile in its character, having the Silurian limestone as its base. At the point now reached, the railroad enters the southeastern boundary of the Cahaba coal-field. This coal-field lies diagonally across the State from the southwest to the northeast, having a form somewhat resembling the longitudinal section of a pear, the wider end resting near Centerville, and the other extending into St. Clair county. The South and North Alabama Railroad crosses it about midway between these points, where its width is about twelve miles. Though comparatively small in area, comprising only about 500 square miles, it is remarkably rich in the extent of its deposits of coal.

You will observe by the section, that the strata which form the southeastern edge of this coal-field are broken and fallen over, so as to abut against the uplifted edges of the limestone in an unconformable position. This break or doubling up of the strata has the appearance of having been produced by some lateral force, which might be attributed to the upheaval of the hypogene rocks in the southeast; but it is more probable that it was caused by a general breaking and falling of the coal measure strata along the edge after it had been elevated by the upheaval of the underlying limestone, as the break appears to be uniformly confined to the immediate border. The strata comprising the seams of coal near the southern limits, are thus caused to dip in both directions, inclining first to the southeast and apparently under the limestone, and again northwest toward the synclinal which forms the basin of the coal-field; the inclination of those to the south varying from 27 to 85 degrees, and those to the north from 15 or 20 degrees to level at the Cahaba river two miles

above, the bed of which stream approximates to the line of the synclinal axis. After passing the Cahaba river, the strata again assumes a southeastern dip, and here for the first time reclines conformably upon the upper Silurian rocks.

Within a distance of six miles after entering this coal-field the road crosses ten or twelve workable seams of coal, varying from $2\frac{1}{2}$ feet to $4\frac{1}{2}$ feet in thickness. The principal ones are locally designated as follows, and occur in the order in which they are given, commencing nearest the southern edge and proceeding north:

Helena.....	4 ft.
Beaver Dam.....	4 " 4 in.
Vicksburg.....	2 " 6 "
Buck Creek.....	3 "
" " No. 2.....	2 " 6 "
" " No. 3.....	2 " 6 "
" " No. 4.....	3 "
Cahaba.....	3 "
" No. 2.....	3 "
Red Gap.....	3 "
Gould.....	3 " 6 "
Brock's Gap.....	3 "

As far as I have been able to observe, these seams generally appear to preserve their continuity throughout that portion of the coal formation lying to the northeast of the line, and several of them are found to increase greatly in thickness as they are traced in a southwest direction along the Cahaba river. In the immediate vicinity of the line, however, those seams which occur near the edge of the coal bearing strata appear in most cases to be disturbed and "faulty" to such an extent as to render them practically of little value. This disturbance, though, appears to be local, as the same seams a mile or two to the southwest regain their regularity. That portion of the coal field near the line of the road has also been much injured by ill-directed operations in opening and mining the coal; so that

any operations designed to be conducted upon modern systems of mining would necessarily have to be located at points somewhat removed from the road. Such, however, is the topography of this region in reference to the outcrops of coal, that those points most eligible for future operations are quite accessible, and may be reached by a branch road at a very inconsiderable cost.

The lands in the valley of the Cahaba are adapted to the cultivation of cereals and fruits, and those upon the southern slope of Shade's Mountain, which lie contiguously and parallel to the river on the north side, are found to be well adapted to the culture of grapes.

Shade's Mountain is the first elevation of any consequence encountered after leaving Calera, the country being moderately undulating until the valley of the Cahaba is reached, when it rises somewhat abruptly to an elevation of 500 feet. The main ridge is crossed at Brock's Gap with a rock cutting of about 50 feet, exposing one or two seams of coal, which are probably the most westerly in this coal-field. The road now enters the elevated valley of Shade's creek, and crossing the bed of the valley obliquely, adopts the opposite slope to attain elevation, by light grades, for the passage of Red Mountain. The first bench of this mountain forms the western boundary of the Cahaba coal-field, and, at this point, an obstacle in the way of reaching Gracie's Gap, by presenting itself as a barrier at the southern entrance of the depression which cuts in two the main ridge and forms the Gap proper.

At this point the South and North Alabama Railroad is intersected by the Mobile Grand Trunk Railroad, which adopts Shade's Valley as its line, and the two roads pass through Gracie's Gap side by side.

The country from Brock's Gap to Gracie's Gap, and indeed that comprised in the entire valley of Shade's creek, is more than ordinarily interesting in the advantages which it presents for the location of iron works. Situated between the iron and coal, contiguous to both, and possessing an ample supply of water and building material, it

+ projected line of the

seems eminently fitted for an iron manufacturing district. The Red Mountain Iron Works and the Irondale furnace are situated in this valley. The former are located immediately upon the line of the South and North Alabama Railroad, and are now being rebuilt upon a liberal scale. The furnaces, it is estimated, will have a capacity of about forty tons per day when completed.

As before remarked, the western border of the Cahaba coal-field rests conformably upon the upper Silurian beds, which comprise the elevation known as Red Mountain, and by far the most important feature in the State of Alabama in an economic view, is here presented in the immense bed of fossiliferous iron ore which forms the northern escarpment of this ridge.

This great deposit of iron ore commences with this range of hills fifteen or twenty miles east of Tuscaloosa, and crossing the railroad in Gracie's Gap, extends uninterruptedly along the crest of the ridge to the extreme north-eastern limit of the State. The stratum is about thirty feet in thickness at the point intersected by the railroad, and I have measured it at various other points, and find that there is no sensible diminution in the size of the bed for ten or fifteen miles on either side.

The ore comprised in the upper part of the bed is stratified and oolitic in its structure, easily split, consisting of a mass of flattened globules and impressions of small shells, and the surface of a recent fracture presents a shining metallic lustre. The lithological character of the lower portions of the bed differs very materially from that of the upper, in being more compact, possessing a brighter lustre, and being entirely devoid of fossils. Although the ridge upon which this ore occurs is called a mountain, it is by no means entitled to such a designation, as its highest elevation does not exceed 500 feet above the neighboring valleys, and the frequent depressions which occur along the ridge, renders the ore quite accessible, and facilitates, as well, the operation of mining.

In New York, this ore is found in the upper silurian

rocks of the Mohawk valley, but not in workable seams. In Hall's district of western New York, it is found in some localities in sufficient quantities to support furnaces, and is regarded as a valuable ore, but it is there subject to great fluctuations in quantity, and in no case exceeds two or three feet in thickness. In Pennsylvania, it again appears, but does not assume any importance until it reaches the middle of the State, and even here its extent is comparatively insignificant. Along the Susquehannah slope of the mountain, where it is chiefly mined, the principal layer varies from 14 to 20 inches in thickness. Mr. Rogers, then State geologist of Pennsylvania, in his report of 1847, estimates four miles outcrop fifteen inches thick and two hundred yards breast, to give 1,400,000 tons above the water level. The whole possible amount of ore in the Montour ridge he estimated to be somewhat over 3,500,000 tons, and adds, that twenty furnaces were running on this ore at the rate of 180,000 tons per annum, which would exhaust the region above the water level in twenty years, and advises a careful husbanding of it as "the principal wealth and *sine qua non* or present key to the remaining riches of the region."

Through Virginia this ore ranges along the base of the New Creek, Prop's Gap, and Back Creek mountains, west of the great valley, and along the edge of the synclinal valley of the Massanutten range, but the deposit does not exceed there, the proportions in which it appears in Pennsylvania.

In Tennessee, all the furnaces west of, and near the Cumberland ridge of the Alleghany mountains, use this ore, two or three feet, however, being the maximum thickness of the beds. It appears, therefore, that not until it enters Alabama does it attain to anything approaching in magnitude the proportions in which it is found exposed in this region ; and what constitutes a most interesting and important feature in relation to this deposit of ore in Alabama, is, its proximity to the other materials necessary for its reduction. Both the coal and limestone lie parallel to

it, and separated by a few miles, throughout its entire length. It would be impossible to associate the materials in a more perfect manner than nature has done.

It will convey some idea of the extent of the deposit to state that a fair estimate shows that there are 15,000,000 tons of ore to each mile along the mountain, lying above the drainage level, and there are at least thirty miles of the mountain that will be tributary to the South and North Alabama Railroad.

The upper portion of the bed, which is not the richest part, was alone worked in the Red Mt. Works, and afforded a practical yield of over 50 per cent. of iron. With charcoal, cold blast, it produces a No. 1 grey iron of a coarse crystalline fracture, very strong, and finely adapted to the manufacture of guns, car wheels and all casting requiring great strength of cohesion. Its suitability for the manufacture of steel, is a subject which to decide, requires, I think, a more thorough investigation than has yet been given it. The presence of phosphorus in the ore is such, it is thought, as may impair, if not destroy completely its value in this respect. Whether this opinion is entirely correct or not, I cannot undertake to say at present. My impression is, however, that it will at least be found subject to modification when the actual quantity of phosphorus contained in the lower, as well as in the upper portions of the bed is known. Heretofore, the only published analyses of this ore apply to the upper portion of the bed which is highly fossiliferous, while the lower part of the seam, which is not generally exposed, has a compact structure, and is entirely free from organic remains. An analysis of a specimen of this part of the ore was made recently by Mr. A. W. McKinsey of Philadelphia, which gave an inappreciable trace of phosphoric acid, which would seem to indicate, that a part of the bed at least, would be adapted to the manufacture of steel, notwithstanding the minute quantity of phosphorus required to exclude it.

In the manufacture of steel by the Bessemer process,

which has now superseded all others, the quantity of either sulphur or phosphorus in the iron is limited to 0.05 per cent., and phosphorus above all other objectionable ingredients, constitutes the most formidable. On this account, the great mass of the pig iron produced in this country and in Europe, is found to be unfit for conversion into steel by this process. In England, the iron of Weardale, Forest of Dean, North Staffordshire and the great Cleveland district, contains phosphorus largely exceeding the required limit, which confines the selection of iron for this process to about one-fifth of the production in England; and it is estimated that only about 1,000,000 out of over 8,000,000 tons of iron produced in Europe, is suitable for the Bessemer process. This process being by far the most direct, has so greatly cheapened the operations that, in England alone, it has increased the production of steel to fifteen times the amount produced before the introduction of this method; the extent of the production appearing to be limited only by the quantity from which proper material can be drawn. It is therefore scarcely probable, with the extensive and almost general application of steel in lieu of iron, and the advancement which is being made in metallurgical science, that some process will not sooner or later be devised to neutralize completely the effect of phosphorus in iron; so palpably great is the importance of an unlimited supply of steel making material.

A mile or two north of Gracie's Gap, brings us to the intersection of the South and North Alabama Railroad with the Alabama and Chattanooga Railroad, the seat of the new and flourishing town of Birmingham. The sudden creation of cities and towns is peculiar to American progress. The remarkable capacity which we seem to possess in this respect is of world-wide celebrity. So rapid indeed has been the development of great commercial centres in the United States during the last quarter of a century, that geographers find it difficult to keep apace with it. We are constantly of late years encountering the name of some new town or city, no where to be found on

the latest editions of our maps, which has suddenly sprung into existence, or grown into commercial importance by some adventitious circumstance. Such a place is this thriving little town. Situated in the centre of a beautiful and fertile valley, eight or ten miles wide, and extending thirty or forty miles on either side, with inexhaustible deposits of iron and coal within a few miles, and the projected centre of quite an extensive railroad system, it promises to be, at some future day, a provincial town of no inconsiderable importance. The mineral resources of this region are becoming so attractive to the chief cities in the adjoining States, that lines are stretching out from various quarters, having their termini here, and speculation points to it as a future centre of distribution, not only of the products of the mines, but of western supplies in all directions. Hence its rapid growth. It owes its existence chiefly to the influence of the South and North Alabama Railroad, which must also form the most potent impulse to its future progress. It is obvious also, that with the growth of Birmingham other new towns will spring up along the line of your road, and the local demand for agricultural products, and the facility of transportation which now exists, will stimulate the development of the agricultural resources of the adjacent country, of which this beautiful valley, embraces so rich and extensive a portion.

This valley is elevated about 600 feet above the level of the sea, and was formed by an upheaval of the Silurian rocks, running parallel to, and probably occurring contemporaneously with that which exposed the hypogene rocks towards the southeast. The coal formation which at this period appears to have extended in an unbroken area over the entire north half of the State, west of the Coosa river, was divided by the convulsion, the upheaval along this valley forming the principal anticlinal which separates the Warrior coal-field from the Cahaba, and other minor coal-fields in the south and east. The debris which resulted from the rupture, partly remains in the form of a range of hills running down the middle of the valley, the upper end

of which contains large deposits of brown hematite ore. The uplifted strata, including the fossil ore forming Red mountain on the south, and that of the coal measures, the sandstone ridge which encloses the valley on the north, and also defines the eastern limit of the Warrior coal-field. Some fine beds of variegated marble outcrop along the slope of Red mountain, which will be valuable for the manufacture of mantles, vases, and ornamental architectural work. It is finely grained and susceptible of receiving a high polish. A bed of sulphate of barytes is found a mile or two north of Birmingham, hand specimens of which appear to be quite pure. Fragments of lead ore are found scattered promiscuously through this country, but chiefly contiguous to Indian mounds which would indicate it to be of Indian origin, though it might be referred to ruins of veins of this ore, that are found in these rocks. Numerous Indian legends are extant in this valley about the existence of lead mines, but they always have some obscure points, or direct the seeker into impossible places to search for this material, so that they are entirely unworthy of any confidence.

Upon leaving the valley and entering the border of the Warrior coal-field, we find, that the broken and deranged position of the strata before alluded to, as occurring on the edge of the Cahaba coal-field, presents itself here also, in a curiously coincident manner, attended with the same crushed and doubled appearance of the strata.

Immediately upon entering the limits of the Warrior coal-field, we encounter the outcrops of coal, seams of which are found exposed in the cuts along the line of the road, and in the beds of the adjacent streams. Within a distance of ten miles after entering this coal-field, some eight or ten seams of coal are exposed, varying from two to six feet in thickness, the positions of which are shown upon the accompanying map and section. Along this part of the line, it will be observed, that the course of the railroad is but slightly oblique to the strike of the strata; so that the whole number of seams included in the distance above

given in the direction of the railroad, are within a comparatively short distance of each other, upon a line at right angles to it. Specimens taken from several of the most important of these seams were sent to Mr. D. J. Morell, Johnstown, Pennsylvania, for analysis, and he reports them all suitable for smelting iron.

At Mr. James W. Vann's, ten miles above Birmingham, two very fine seams, one of six feet and the other of four feet thickness, outcrop immediately upon the line of the road. These seams of coal are accompanied by a seam of carbonate of iron varying from 15 to 24 inches in thickness, of which the following is an analysis:

Volatile and organic matter	34.62
Insoluble matter.....	4.73
Oxide of iron.....	54.08
Metallic iron 46.66 per cent.	

It is from this kind of ore that a very large proportion of the iron manufactured in Great Britain is produced; the celebrated Scotch pig being made from it. The ore is found also to facilitate the reduction of the more refractory ores by admixture with them in the process of smelting, and will in this manner prove valuable in working the neighboring red and brown hematites. The extent of this ore is yet imperfectly known, but enough has been ascertained to establish the fact that it is extensively developed in the Warrior coal-field along the line of the road, though rarely exceeding two feet in thickness. The thickest seam of this ore found in the west of Scotland is the Airdrie mine, which is 16 inches thick. It is, however, profitably worked in much thinner seams even than this. The Bell-side, Calderbank and Kennelburn black band, being only six inches in thickness. In North Staffordshire, it is found in beds from four to nine feet thick, and is calcined and transported in large quantities to the furnaces in the southern portion of that district. In South Wales, it is much less extensive and regular in its occurrence, being found only in small beds and confined chiefly to the western part of the coal district.

It is proper to add in connection with this class of ore, that the deposits are often very deceptive as to their extent and value, and it is generally difficult to determine correctly in either of these particulars by surface exposures. A thorough exploration of the bed is essential to conclusively establishing its actual character, as its composition not unfrequently changes to bituminous or argillaceous shale, or runs into their seams of coal, or on the other hand may improve in quantity and quality.

The strata a short distance above Vann's appear to have been subjected to more than ordinary disturbance. For a space of two hundred yards along that part of the line immediately south of the first crossing of Cunningham creek, they are distorted, and thrown into the most indiscriminate disorder, but directly beyond this space, near the creek, they relapse into nearly a level and undisturbed position. The inclination which near the border of the coal-field was about 20 degrees is reduced to about 10 degress at Vann's and at this point it subsides suddenly to between one and two degrees. For a distance of three or four miles along the line of Cunningham creek, which frequently intersects that of the railroad, the stream is confined by the precipitous nature of this portion of the valley to a narrow channel, which in many cases contains, for a considerable length, too much water to admit of an examination of its bed. Below Hagood's, however, the valley widens, and the bed of the stream becomes more frequently exposed, and from this point to its junction with Turkey creek, a number of coal outcrops appear in it. The numberless creeks and branches by which this region is watered, greatly facilitates an examination of its structure, as the strata is sufficiently inclined to present their edges to the denuding force of the water, which has cut through them and exposed their composition; and there is scarcely a stream flowing in the direction of the Warrior river that does not expose one or more seams of coal.

The surface of the country, which, from the border of the coal-field to this point, is hilly, and in some cases, rug-

ged, now becomes slightly undulating, with extensive table lands and rich valley bottoms along the borders of the larger streams, until we reach the Locust fork of the Warrior river. The banks of this beautiful stream, adjacent to the crossing of the railroad, are abrupt, and descend rapidly from the table land on either side to the edge of the water. A few hundred yards east of the line, a seam of coal about three and a half feet thick crosses diagonally the bed of the river. The dip of the strata is so slight that the denudation of the overlying ledge of sandstone has laid bare the bed for a considerable distance along the bottom of the stream.

Quite an extensive area of coal existed, at one time, in the bed of the river at various points, which led to the adoption by Mr. Handy, some years ago, of a somewhat novel and ingenious system of mining. During the dry season of the year, when the depth of the water is but a few feet, men were employed to dislodge the coal in large blocks, with wedges and crow bars, and then with the aid of a floating derrick, it was lifted into flat-boats constructed to transport it down the river to Mobile, during the high stages of the river.

The Locust fork occupies the basin of that part of the coal-field which is drained by its waters, and such is the direction of the strike and inclination of the strata relatively to the line of the railroad, that in this locality, only the most remote of those seams of coal which have been mentioned, are without the range of shaft mining at a moderate depth, while several, including the one outcropping above the bridge, can be reached from the grade of the road, with a shaft of one or two hundred feet in depth.

After crossing the Locust fork of the Warrior river, the line of the road is located upon an extensive table land, nearly level, reaching eight or ten miles in a northerly direction, where it terminates in an abrupt descent into the valley of Hoglan's creek. The course of the railroad deflects from this direction, and leaving the table along its western border, follows the summit of a spur which

connects it with the dividing ridge between the Locust and Mulberry forks, and crosses to the eastern slope of the latter. The line then follows this slope of the mountain, until it reaches Reid's Gap, through which it passes to the head of Murphy's creek valley. From the Warrior to Reid's Gap, there is scarcely any perceptible deviation from a level in the position of the strata, and consequently the exposures of the underlying coal are few. The country, however, is known to be underlaid with several very valuable seams of coal, and a deposit of black band ore which will probably develop itself as an important feature. I would urgently recommend that a more thorough examination of this region be instituted by the application of boring apparatus, in eligible localities for obtaining sections of the series of strata comprised in the middle and upper group of the coal measures.

After passing Reid's Gap, I find that the carboniferous limestone has to be pushed up by an upheaval parallel to that of Jones' valley, elevating but slightly the coal strata on the south, but forming a high and precipitous range of mountains on the north-west. The exposure of the limestone is confined to the immediate vicinity of Murphy's creek and its branches, which head near the gap, while the coal measures to the south-west, in the direction of the upheaval, remain undisturbed. The line of the road now follows the valley of Murphy's creek, along the strike of the rocks, to its junction with Mill creek, and then up Dry creek, passing within a few hundred feet of the celebrated Blount Springs. The country in the neighborhood of Blount Springs is exceedingly picturesque, possessing scenery of almost every variety, from a wide-spreading valley to the most precipitous mountains. The views are surpassingly beautiful from all of the more prominent elevations adjacent, and particularly so from Duffie's mountain, a rugged steep near by, the mural face of which, is itself a feature of more than ordinary grandeur in the picture which is presented in approaching the springs from the south.

The springs, which have long been noted for their medi-

cinal qualities, issue from a small patch of silurian shale, which has been forced up through the mountain limestone, and comprise several varieties of water, situated within a few feet of each other. The want of convenient access to them, or rather the advantage in this respect which others less meritorious, have possessed, has for many years deprived them of the patronage which they appear to deserve.

Five miles above Blount Springs, the railroad passes through Copperas Gap, leaving the limestone and again entering the coal measures of the Mulberry fork of the Warrior river, the strata dipping at an angle of 15 or 20 degrees, and toward the north-west. As we approach the river, which runs along the base of the western slope of the mountain just passed, the inclination of the strata again diminishes rapidly to nearly a level position, which it maintains to Sand mountain, which forms the northern boundary of this rich and extensive coal-field. That this portion of the Warrior coal-field also abounds in coal is unquestionable, as it appears more or less, in all of the streams, but the horizontal position of the strata prevents any exposures, except where the streams have cut through them to a considerable depth. There is a marked difference, also, in the character of the coal in this region to that further south, in being more compact, cleaner and lustrous, and being less disposed to disintegrate by handling. Three or four seams, varying from thirty inches to five feet, bearing these characteristics, have come under my observation in this region, the locations of which are indicated upon the accompanying map. The nature of the land for agricultural purposes is good, and under the adoption of improved systems of cultivation, will be found quite capable of supporting a large population. From Sand Mt. to Decatur, a distance of twenty miles, the line passes over the fertile valley of the Tennessee river, the country being composed of carboniferous limestone in horizontal beds. The summits of the more prominent hills are capped with like horizontal layers of the sandstone of the coal measures, not unfrequently interstratified with thin seams

of coal; showing that the valley is one entirely of denudation.

In glancing the eye over the accompanying section which presents all the prominent features of the structure of the country, we cannot fail to observe with what a wonderful sagacity it has been formed, and arranged to meet the requirements of man, and facilitate the development of its resources. A wide spread sandstone plain has been broken asunder, and its underlying treasures of iron and coal, the world's greatest source of wealth, have been brought to light, that otherwise would never have been known to exist, and in their midst rich valleys and beautiful streams, which, all combined, in plainest language,

“Assert eternal Providence,
And justify the ways of God to man.”

DONATED LANDS.

The total area of the lands selected by the company under the donation by Congress, is 535,091 acres. Of this amount, about 50,000 acres are situated along the line between Montgomery and Calera and the remainder between Calera and Decatur; the latter, including a very large proportion of the coal and iron deposits described. The locations of the most important of these deposits, relatively to the company's lands, are best seen by reference to the accompanying maps, and they will be still more minutely indicated upon the land plats, which are to form a part of the records of the land department of the company, and which will serve as an index to the mineral value of each separate tract. It will be sufficient, however, to state at present, that the amount of coal contained in those lands of the company which lie in immediate proximity to the road, may be practically regarded as inexhaustible. The extent of the iron deposits comprised in the company's land, though of course by no means so vast as that of the coal, is, nevertheless, of great extent and value. For the purposes of agriculture, a very large proportion is well adapted, and the facility which is

now afforded by the railroad for transportation, must enhance their value very greatly in this respect. They are not generally as productive as some of the western lands are represented to be, but they are highly susceptible of improvement, and they have the advantage of a far less rigorous climate. The country has been settled also, for more than fifty years, and the population therefore, is of that character which insures the steady growth of the moral, social and educational advantages which are now enjoyed to a degree unknown in the far west. The industry of the State has heretofore been almost exclusively agricultural, and nearly the entire capital and labor have been employed in the culture of cotton. Under the slave system, this has been in a great measure concentrated in the southern portion of the State, as being best adapted to the cultivation of that staple, and for the climate of which the negro constitution was best fitted. The middle and northern portions of the State, which are eminently suited, both in soil and climate, for the cultivation of cereals and fruit, and for raising cattle, have, therefore, been comparatively neglected. The meagreness of the negro element in the population of this part of the State is also in consequence of the direction given to the different industries, as it were, by nature. A great change in the industrial character of the State is now about to take place. A large manufacturing community is about to spring up here, and with it a demand for the very products which this region is most capable of producing. The effect is patent, and requires no elaborate argument to enforce or elucidate.

The influence which railroads have everywhere had in augmenting the value of landed property, will operate here with all the force that it manifests in other parts of the country, and has an important bearing upon the prospective value of this property of the company. In Georgia, lands which, in 1846, sold for ten to fifty cents an acre, commanded three years later, when the Chattanooga Railroad was completed, from ten to twenty dollars. On the line of the Mobile and Ohio Railroad, lands, for which no

sale could be obtained since the first settlement of the country, were at once brought into market at from three to ten dollars per acre by the construction of the road. The value of pine lands was found to increase at the rate of 500 to 5,000 per cent. In Ohio, when there were only eighty-three miles of railroad, the taxable property amounted to \$136,000,000, and when in 1870, three thousand four hundred miles had been constructed, the assessed value of property was \$1,000,000,000, excluding the real estate belonging to railroad companies. In Indiana, the construction of eighteen hundred miles of railroad increased property valuation \$116,000,000. In Georgia, six hundred and nine miles of railroad augmented the property valuation \$248,000,000 and thirteen hundred and seventy miles \$600,-000,000. Such examples might be multiplied *ad infinitum*, but this influence is generally known and understood. Indeed, it has become now a simple matter of calculation to ascertain the advance in value that land will attain by the advantage of railroad transportation. Statistics in reference to the increase of valuation due to this cause have so accumulated, and appear generally so uniform under like conditions, that the proportional increase effected by the construction of a railroad, may be reduced to a simple formula. It is customary, however, in making this a matter of calculation, to assume the weight of the marketable productions per acre, and the cost per mile to haul it, and compare this cost with that of the transportation by railroad. The difference, then, is the increased value of the productions per acre, which establishes the increase of value to the lands.

In this manner, the average cost of hauling upon ordinary roads, is ascertained to be about seven times that upon railroads. The effect of railroads upon lands through which they pass, is, therefore, practically to draw them within one-seventh of their actual distance from market, and increase the value in that proportion.

Mr. Poor, in his manual upon railroads for 1870-71, states "that every railroad constructed, adds five times its

cost to the aggregate value of the property of the country." This is doubtless a fair estimate for agricultural districts; but I conceive it to be very much below the effect of opening up to development such a field of mineral wealth, as that through which the South and North Alabama Railroad passes. Improvements in railroads and canals, built expressly for the anthracite coal trade in Pennsylvania, foot up to no less than *four hundred millions of dollars*, and a force of 52,227 men is employed in the mines, representing a population of about 200,000.

To approximate more nearly the influence of your road in enhancing the value of property along its line, involves a consideration of the facts which bear upon the question of the prospective demand upon its resources, its capacity to supply it, and the advantages which it possesses for so doing. In proceeding to a discussion of these questions, it is proper to premise by directing attention to the geographical position of the mineral region of Alabama, and recalling to mind the exceptional feature embraced in it, of a congregation of all the materials essential to an illimitable and varied manufacturing industry, at the base of which, rests an inexhaustible supply of coal, under the most favorable conditions for economical mining.

"A race is going on," said Mr. Gladstone, in a speech before the House of Commons, "between the nations of the earth in industry and enterprise, and no doubt can exist on the question which nation is at this moment foremost in the race. The people of the United Kingdom are by far the foremost. * * * * We have undoubtedly got the start in the race, and it behoves us to inquire what special cause has given it to us. * * * * The chief cause is the possession of our mineral treasures, the fact not merely the possession of coal, but the possession of vast stores of coal, under such circumstances, that we can raise it to the surface at a lower price than any other country in the world. I think it is clear, that at whatever time we may cease to be able to raise coal at a lower price than any

other countries, our relative position towards other nations must be seriously injured."

In a subsequent debate, Mr. Vivian said, "It is utterly impossible to exaggerate the enormous importance of this question. The greatness and prosperity of England rests upon her manufactures, and her manufacturers upon her coal."

To the same effect, Mr. Liddell remarked, "It is a mere truism, to say that the manufacturing supremacy of this country depends upon our retaining a cheap supply of coal."

This observation of Mr. Liddell is illustrated more thoroughly than elsewhere in this country, perhaps, in the comparison of the progress of the manufacturing industry between the two great manufacturing towns of Fall River and Lowell, Massachusetts.

The water power of New England is not only subject to the great drawbacks of ice, droughts and freshets, but this source of power is rapidly diminishing. This is attributed to clearing of forests, and cultivation which drains the swamps and low grounds, that originally formed natural reservoirs; and to such an extent has this reduction proceeded, that it is now estimated that the power of valuable mill privileges has depreciated no less than forty per cent. Lowell and Fall River, were both located with reference to a supply of water power, and so far as cotton spinning is concerned, which is their chief industry, Lowell was in 1865 largely in advance, returning 385,412 spindles, while Fall River returned but 241,218. Shortly after Fall River exhausted her water power, and more recently, Lowell has done the same. Fall River was situated on the southern seaboard, while Lowell was twenty miles by rail removed from tide water. The mills at Fall River, now contain 1,017,114 spindles, while Lowell numbers but 570,586. The essential point in the more rapid development of the former, seems to have been the superior facility which it possessed over the latter, for obtaining coal. Already engines whose aggregate horse pow-

er exceeds 5,000, have been introduced as auxiliaries in the mills of that city, and a large supply of coal is necessarily required to generate steam for this additional power, and in the various processes of manufacture. But the demand which this department of industry makes upon the supply of coal, is insignificant compared with that required for the production of iron.

To afford some idea of the consumption of coal in the manufacture of iron, it may be interesting to state, that the total number of blast furnaces in Great Britain is 920, of which only five are charcoal furnaces. The amount of coal raised from the mines of that country last year is estimated at 120,000,000 tons, and the amount of iron produced was 6,300,000 tons. This iron required for its reduction and conversion into bar iron and other forms of manufactured articles, about five tons of coal to the ton of iron, or 31,500,000 tons—over one-fourth of the vast production of the coal mines of that country, and within two and a half millions of the entire production of coal in the United States.

In 1818, England produced 300,000 tons of iron. In 1840, the United States produced 347,000 tons. In 1847, England produced 1,999,508 tons, which is about the same as the present production of this country. It would appear, therefore, that England has the start of the United States in making iron of about twenty-five years, which has been maintained since the earliest records of that industry. It is fair to surmise, therefore, that the production in the United States before the end of the present century will exceed the present production of England, if the ratio of increase up to the present time, is maintained. Of this, there is not only every probability, but there exists the most conclusive evidence.

The consumption of iron in the United States in 1871, was 2,650,000 tons, exceeding the home production by nearly one-third, and amounting to nearly one-half of the production of Great Britain. The unprecedented demand existing at the present time for iron, is a subject of com-

ment throughout the civilized world. The most recent reviews and discussions of the subject, show that the demand for iron has increased much faster than the production. The substitution of iron for wood, in the construction of ships especially, has greatly increased its consumption, and the wonderful growth of the railroad system in the United States, would alone furnish sufficient argument and incentive for its production upon a far greater scale of magnitude than exists at the present time. But we must take the subject in all its bearings, and appreciate its importance from the cumulative testimony which the whole world submits. It has been well said that railroads are modern missionaries. The missionary ordinarily recognized by moral economists, preaches to the heathen and sets forth the benefits of some peculiar religious creed, or perhaps the general advantages of christianity and civilization. Yet the heathen often meets these arguments with the beauties of his own faith, and the benefits of his own moral and social system. But let a railroad train pass through his territory at the rate of thirty or forty miles an hour, and the argument is unanswerable. Railroads are breaking down the old and most formidable barriers of civilization, when every other influence fails. In our own country, they have extended civilization far out on the western prairies. In India, idol-worship is becoming extinct in proportion as railroads permeate the country, and the wealth of that country is being developed more and more each year through their agency. Japan is being aroused to the importance of this great means of development, and within the past few months, has celebrated its first grand achievement, the completion of a railroad from Yeddo to Yokahoma. China in time must yield to the advancing tendency of the age, and the primitive styles of travel there, must be replaced by railroads. Russia for some years past, has been moving actively in the matter, and has become thoroughly awakened to the necessity of railroads, to rescue portions of the empire from its semi-barbarous condition. But lately the Russian government

negotiated a railroad loan in London of 17,000,000 pounds sterling, and upon the strength of this loan orders were placed with English mills for nearly 200,000 tons of rails. It is this great demand from Russia, in connection with causes of subordinate magnitude, that has stimulated the demand for iron during the present year in England, and enforced the general advance which has so suddenly enlivened the market. The South American States, including the Empire of Brazil, have also made notable progress in the construction of railroads. Costa Rico, Honduras and Mexico, have important lines already in course of construction, while Peru and Chili are also perfecting extensive systems of railroads, which will require the expenditure of a hundred million of dollars to complete, and the United States is the most natural direction for them to look for supplies. The requirements of Russia, India, Egypt, Japan and Australia with the domestic consumption, will soon absorb the entire furnace capacity of all Europe. The demand of this hemisphere, at least, must sooner or later be met by us.

Coming back to the United States, we find that each year the railroad mileage is increasing rapidly to accommodate the growing traffic, laying the basis for an increased demand, not only for new roads, but for the replenishment of old ones, both in the matter of rails and rolling stock. When we realize the fact, that in 1851, the earnings of all the railroads in the United States were \$1 62 per head of population, and in 1871, over \$11 50; is it any wonder that railroad building is being increased so rapidly? It must not be imagined either, that the impetus in railway construction at this time is temporary. If the ratio of mileage in the States, exclusive of territories, in proportion to their area, was equal to that of Ohio, it would require 200,000 instead of 60,000 miles of railroad; and if the construction of railroads continues, as there seems every probability of its doing, at the rate with which it has progressed for the last ten years, this aggregate will be attained in twenty years from the present time.

A fair estimate of the amount of iron that will be consumed during the present year, would be twenty per cent. over that of 1871, or about 3,000,000 tons. The 60,382 miles of railroad in operation at the commencement of the year, will require not less than 500,000 tons for repairs, and the new roads 1,000,000 tons, making 1,500,000 tons for railroads alone. The amount of railroad iron consumed in 1871 was 1,294,386 tons ; of this amount, there were manufactured in this country 722,000 tons, the balance of 572,386, were imported. England alone, supplying 511,059 tons, and including other forms of iron, 826,088 tons, or about one-third of our total consumption of iron during the preceding year.

Had this amount of iron been made here, it would have given employment to 75,000 men and required 3,000,000 tons of coal for its production. Would not the country be more greatly benefited by importing the labor instead of the iron ? It is an absolute disgrace to the country that so large a portion of this manufacture should come from abroad, and the immense profit now realized in this manufacture, renders still more unwarrantable such a want of enterprise. The present price of pig iron, which was \$35 last year, is \$50 and \$55 per ton. That this advance is a natural and healthy one, admits, I think, of no question, and is the legitimate consequence of the productive power being inadequate to supply the demand. It is a fallacy to base a supposition to the contrary upon the broad assumption, that furnaces already constructed possess a capacity equal to the supply needed. Their capacity is exactly what they do produce, and not what they are supposed to be capable of producing.

There are reported in the United States at the present time, 700 blast furnaces, the number being largely swelled by including many of primitive form and small capacity that belong to a different era in iron manufacture. In 1860, Ohio, Indiana, Michigan, Illinois, Wisconsin and Kentucky had seventy-six blast furnaces, that produced 85,273 tons. In 1870, three new works alone produced

200,000 tons. The following is estimated to be the present productive capacity of the principal iron regions of the United States :

	TONS.
Lehigh region, Pennsylvania	378,000
Schuylkill " "	160,000
Pittsburgh, "	120,000
Shenango Valley, "	190,000
Ohio	200,000
Michigan	60,000
Wisconsin	70,000
Missouri	130,000
Illinois	60,000
	<hr/>
	1,368,000

An additional furnace capacity of about 600,000 tons is distributed in New York, Maryland, Kentucky, Tennessee, Virginia and Alabama.

In the preceding year, the amount of iron produced in this country was about 1,900,000 tons, consisting of 875,000 tons of anthracite iron, 650,000 tons of bituminous coal and coke iron, and 375,000 tons of charcoal iron, and this was less than the amount consumed in various forms by nearly a million of tons. If there is one thing made more apparent than another by an investigation of this subject, it is that the manufacturers of bar iron must have their own furnaces ; for while they have been finding it difficult, and in some instances, impossible to fulfil their contracts, *furnace owners will make thirty or forty millions of dollars out of the advance of \$15 or \$20 per ton on the 2,000,000 tons which it is estimated will be produced in the United States this year.*

The struggle for pig iron by the various mills throughout the country, amounts almost to a panic, and there seems to be no likelihood of its subsiding. The *Miner's Journal* says :

"Everything shows an insufficiency of iron, pig and rolled, forge and Bessemer alike, to satisfy the wants of

the civilized world. Nor will the growth of the manufacture for a long time keep pace with the ever-enlarging demands made upon it. Fluctuations in the annual product of this or that iron region or country does not materially alter the general situation. Sweden and Norway may not (as reported) produce more than half their usual quota. Old furnaces are going into blast and new furnaces building elsewhere. But it is easier to deplete the iron market when iron is low, than to refill the yards when a scarcity has run up iron to prices which both collect capital at old works and invite its investment in new ones.

"It takes time to establish iron works ; time to get ore mines into working order ; time to construct mill machinery ; time to train skilled hands at the Bessemer retort. Meanwhile new railway projects are set on foot every week. Russia anticipates her usual spring orders in England by sending them four months in advance.

"The fact is, when the age makes a great forward movement of any kind, it happens as with the march of an army, whatever is wanted is wanted in unusual quantities and at once, and therefore must be paid for at famine rates. Americans are building so many railways, bridges, depots, and so much rolling stock, that they must not only pay the highest price, but must immediately lay out a great deal more of the money on mills, furnaces and mining, to provide materials. As the same history is recording itself abroad, and even distant parts like Japan and China are making their appearance on the scene of action, each nation will continue to be strained to its utmost strength to do its own work. It is not merely that the London iron market rules that of Philadelphia, but when England is overtired America must help herself.

"We have no doubt that the present high price of iron will continue to rule, and we hope it will ; for nothing short of the sight of both steady and uncommonly large profits made in the manufactures of iron will turn our capitalists from gold, stock and distant wild-cat mining speculations, to take the good old path of investment in substantial

minerals, coal mines and iron works nearer home, by which a perpetual benefit to all classes of society is sure to be secured."

The productive power of England is at its zenith, while that of the United States is just rising above the horizon. As civilization extends, the demand for this product increases. The world must be supplied, and the resources which England possesses to meet this growing demand, sinks into insignificance when compared with that of this country. The question of competition between the two countries is now entirely one of labor.^{*} It will soon be one of comparative resources. Not from a diminution of the cost of labor, but from an equalization in the facility of production may we expect that the productive capacity of this country will be placed upon the same footing with England, and I am but expressing the opinion of the most experienced and far seeing men of the country, when I assert the belief that in the supply of this material, it is the destiny of Alabama to inaugurate the era of our successful competition with the world. To support this assertion, I do not think I can submit more competent testimony than will be found in the following remarks made by Abram S. Hewitt, Esq., at a meeting of the Polytechnic Association of the American Institute held less than a year ago :

"The region in Alabama to which our attention has been called to-night is unquestionably the most interesting region in the United States, with reference to the interests of iron manufacture in this country. It is in fact the only place upon the American continent where it is possible to make iron in competition with the cheap iron of England, measured not by the wages paid, but by the number of days' labor which enter into its production. The cheapest place until now, on the globe, for manufacturing iron, is the Cleveland region in Yorkshire, England. The iron produced from a fossiliferous ore, containing phosphorus, making it cold-short, costs there about 32 English shillings on the average per ton, which represents about ten (10)

^{*} The growing facilities of intercommunication between this country and Europe will tend to equalize the cost of labor.

days' labor. The distance of the coal and the ore from the furnaces averages there about 20 miles.

"Now in Alabama, the coal and the ore are in many places within half a mile of each other. The sandstone formation thins out towards the South, and in Tennessee and Alabama appears to be replaced by this bed of fossiliferous iron ore, which commences in New York, with a thickness rarely exceeding two feet, but steadily thickens towards the South, averaging four feet deep in Pennsylvania, seven or eight feet in Tennessee, while in Alabama, probably because the formation was crushed back upon itself in some way, there are places where the iron has been measured 150 feet in thickness.

"The manufacture of iron is carried on as yet in rather a crude way in Alabama; but the cost of the iron is only about ten days' labor to the ton, or not far from the labor cost in Cleveland. Throwing aside then all questions of tariff for protection, here is a possibility upon the American continent of producing iron at as low a cost in labor as in the most favored region of the world, and allowing for the expense of transportation to compete with them, paying a higher average rate of wages than is paid in Great Britain.

"The consumption of iron is increasing at a rate so wonderfully rapid that in ten years it will be impossible for Great Britain to supply the demand. There is no other country in the world which can make iron as cheaply as Great Britain. In fifty years then the United States must be the source from which the iron of the world will be derived. Instead of importing a million of tons per annum, as we now do, in fifty or a hundred years we shall export five or ten millions per annum. This region, so exhaustless in its supplies, so admirably furnished with coal, so conveniently communicating with the Gulf, will be of infinitely more consequence to us for its iron than it has ever been for its cotton. There is the foundation for an industry and a prosperity which no curse of slavery, no

rebellion, no interference with commercial laws can ever overturn.

"I think this will be a region of coke-made iron on a scale grander than has ever been witnessed on the habitable globe. The present production in the Cleveland region, where in 1853 there was not a furnace, is now two millions of tons; and very soon it will be four millions. The production here will far exceed that."

It is scarcely necessary to treat further upon this subject, or the co-ordinate question of coal production. The two are blended together in their relations with manufactures and commerce, while the advancement of every interest, involving the prosperity of a people, is practically dependent upon them.

In reviewing the details of the work just accomplished in the completion of the South and North Alabama Railroad, with especial reference to its effect upon the material interests of Alabama, it cannot fail to be observed, that precisely the same influences have at length been secured for this State, that have peopled the States of the great west and northwest, and made them rich and prosperous. By a rare combination of fortunate circumstances, the company have not only been able to find a through line from the west to the sea, but to find it through a country eminently rich in those resources of trade which constitute the chief commerce of the world.

In opening up this portion of the State of Alabama to the facilities of commerce, it has also been opened to immigration from other States and from foreign countries, and it is necessary in treating the problem of development to recognize and to utilize the means of attracting a population accustomed to work, and to give them work to do when we have drawn them here. It is not by any means a matter of merely producing a diversion of the current of emigration, and congregating a population, but it is a matter which involves a systematic preparation and liberal investment to afford remunerative labor.

To foster and encourage particularly the manufacture of

ron, I would respectfully submit, should be one of the prime considerations of your company. As a means of populating the line of the road and developing the mineral and agricultural resources of the country, such a policy would prove a permanent source of profit, while it would vivify the whole region through which it passes, *and I regard this donation of land of most value, viewed as a means to aid the company in the accomplishment of this object.* Apart from the high considerations of public convenience which makes the South and North Alabama Railroad one of the most important avenues of trade in the country; nothing so peculiarly and persistently enforces itself upon the consideration as the subject of local manufactures. Certainly, in my investigations, nothing has so strikingly fixed itself upon my attention as this great interest, and I believe that I can close my report in no more fitting manner, than by urging the facts and suggestions here presented, though at the risk of seeming to repeat views already submitted for your consideration.

I am, respectfully,

Your obedient servant,

HIRAM HAINES,

Consulting Engineer.

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